

STUDIES OF NEOTROPICAL CADDISFLIES, XXI.  
THE GENUS *LEPIDOSTOMA*  
(TRICHOPTERA: LEPIDOSTOMATIDAE)

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In this paper we are describing five species of the genus *Lepidostoma* from Mexico and Central America, as well as presenting other taxonomic notes and distributional data.

*Lepidostoma* is not encountered in all parts of Mesoamerica, and in fact its distribution is greatly limited in this region. All collecting sites whose ecology is known are at higher elevations in primarily pine forests. Cabrera and Willink (1973) have called this the Provincia Mesoamericana de Montana and we show its distribution in Fig. 1. As far as we can determine all collection sites of *Lepidostoma* fall into this distributional pattern. Thus this genus, together with the Limnephilidae, are excellent indicators of this biogeographic province in Mesoamerica.

The only apparent exception is *Lepidostoma rhino* Ross, known from Rio Santo Domingo, 1,000 feet elevation, in Baja California. This situation is interesting because this species is the only one of the *pluviale* group known from Mexico and it is known from the Provincia del Bosque Montano which Cabrera and Willink place in the Holarctic Region, thus reinforcing the derivation of the Mesoamerican *Lepidostoma* fauna from Holarctic ancestors.

Key to males of Neotropical *Lepidostoma*

1. Clasper long and slender, with a small basodorsal process *rhino*  
- Clasper short, broad, with two basal processes, one erect and other parallel to dorsum 2
2. Clasper ending in a single fingerlike process in both dorsal and lateral aspects 3  
- Clasper ending in several lobes or processes, none fingerlike in either dorsal or lateral aspects 4
3. Costal cell of forewing narrowly reflexed, especially apicad; basal antennal segment longer than head and covered with enlarged, anteriorly directed, black hairs; palpi elongate and also covered with long, widened hairs *frontale*  
- Costal cell of forewing normal; basal antennal segment as long as head, with hairs radiating in all directions; palpi with scattered long hairs on outer surface *mexicanum*
4. Tenth tergum divided on each side into an erect dorsomesal lobe and a more ventral lobe, also directed dorsad 5



Fig. 1. Distribution of certain biogeographic provinces with superimposed (dark dots) collecting sites of *Lepidostoma*.

- Tenth tergum divided into lateral platelike lobes, more or less entire 7
- 5. Apex of clasper with a bifurcate lobe laterally *aztecum*
- Apex of clasper with a rounded, serrulate lobe laterally 6
- 6. Tenth tergum with an elongate posterolateral process above venter; clasper with apicolateral serrulate lobe small, and without a well defined lateral lobe *heveli*
- Tenth tergum with posteroventral process longer than posterolateral process; clasper with serrulate lobe well developed, and with a distinct lateral lobe *steinhauseri*
- 7. Tenth tergum in dorsal aspect with lateral lobes diverging from near base 8
- Tenth tergum in dorsal aspect with a short, narrow mesal division, with lateral lobes bearing a right-angled shoulder on inner faces *talamancense*

8. Basodorsal process of clasper long, reaching to, or nearly to, apex of clasper as seen in lateral aspect 9  
 – Basodorsal process of clasper short, reaching no more than middle of clasper as seen in lateral aspect 10
9. Clasper in ventral aspect terminating in a lateral hook and rounded mesal lobe *bakeri*  
 – Clasper in ventral aspect terminating in two rounded lobes *knulli*
10. Apex of clasper in ventral aspect terminating in a pointed lateral spine, and a rounded lobe mesad *delongi*  
 – Apex of clasper terminating in three lobes of different form 11
11. Clasper with ventral arm of basodorsal process produced into a sharp point; apex of clasper with a serrate lateroventral lobe *lacinatum*  
 – Clasper with ventral arm rounded apically; apex without a serrate lateroventral lobe 12
12. Tenth tergum in lateral aspect about twice as long as broad; basodorsal process of clasper at least three times as long as broad *reimoseri*  
 – Tenth tergum laterally about as long as broad; basodorsal process of clasper hardly 1½ times as long as broad *rectangulare*

#### Pluviale Group

Only one species of the *pluviale* group is reported from Mexico or Central America, although many species have been described from the mountains of the western United States. The group is very distinctive on the basis of wing and genitalic structures (Ross, 1946, p. 274).

#### *Lepidostoma rhino* Ross

*Lepidostoma rhino* Ross, 1946, p. 276; 1951, p. 75.—Schmid & Guppy, 1952, p. 42.—Denning, 1964, p. 134.—Fischer, 1970, p. 63.

This species was described from northern Baja California, and is still known only with certainty from those examples. It was later recorded (Schmid & Guppy, 1952) from Vancouver Island, British Columbia, but this record is probably a misidentification of the closely related *L. rayneri* Ross. The original description (Ross, 1946, fig. 4) is accompanied by excellent figures of the male genitalia.

#### Unicolor Group

The *unicolor* group contains the greatest number of described species in the New World, and is also the most widely distributed. Species are

known from eastern, northern and western North America, and south through Central America to northern Panama.

Although the species of the group all have rather short and broad claspers, they differ greatly in the type of processes they bear and in the form of the tenth tergum. There are also great differences in the type of modification of the male antennae, palpi, wings and legs. The species are treated alphabetically within the group.

*Lepidostoma aztecum* Flint & Bueno, new species

Figs. 2-3

This, and the species *L. heveli* n. sp. and *L. steinhauseri* n. sp., herein described, form a closely related species group, based on the bifid nature of the tenth tergum. Among these three, *aztecum* is easily distinguished by the more erect basodorsal process and bifid apicolateral lobe of the clasper, and shape of the lobes of the tenth tergum.

*Adult*.—Length of forewing, 10-11 mm. Color brown, antennae stramineous; forewing irregularly mottled light and dark brown. Maxillary palpus 1-segmented, spatulate, both palpi contiguous apically, mesal face concave and filled with broad scale-like setae. Antenna with basal segment terete, as long as head, unmodified; legs and wings without sexual modification. Male genitalia: Tenth tergum in lateral aspect divided into two pairs of processes, dorsalmost narrowly divided middorsally, ending in a small point dorsolaterally, ventralmost process elongate, erect, ending in a series of setate points, processes widely separated in dorsal aspect. Claspers with basodorsal process semierect, extending slightly beyond midlength of clasper, ventral arm of process appressed to clasper, rounded apically; apex with a bifurcate lateral lobe, a compressed, broad central lobe, and a rounded, depressed mesal lobe; with a sinuous basal connection with base of aedeagus. Aedeagus with an enlarged base, a central curved tubular portion and dorsolateral swordlike processes reaching nearly to apex.

*Material*.—Holotype, male: MEXICO, Morelos, Lagunas Zempoala, 2 June 1976, J. Bueno-Soria. USNM Type 74073. Paratype: Same data, 1♂.

*Lepidostoma bakeri* Flint

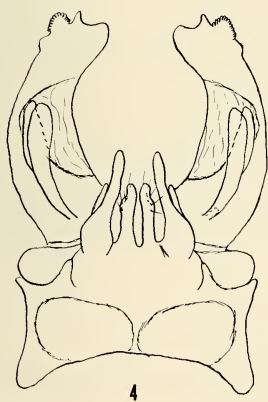
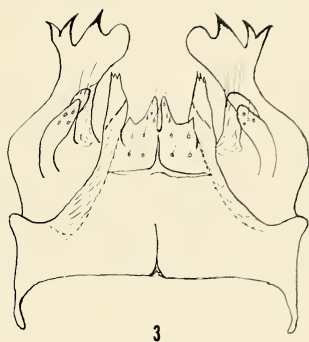
*Lepidostoma bakeri* Flint, 1965, p. 175:1967A, p. 175.—Denning, 1968, p. 68.

This species has been reported (Denning, 1968) as the most abundant *Lepidostoma* in southwestern Arizona. It is also widespread over Mexico

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Figs. 2-7. Male genitalia. *Lepidostoma aztecum* n. sp.: 2, Lateral; 3, Dorsal. *L. heveli* n. sp.: 4, Dorsal; 5, Lateral. *L. steinhauseri* n. sp.: 6, Dorsal; 7, Lateral.





and south to Guatemala as the records testify. There is some variation in the shape of the apical hooklike process of the clasper. In the series from Chiapas and Guatemala, and to a lesser degree, that from Veracruz, the apical half of this process in lateral aspect is sharply angled ventrad, but does not appear greatly different in ventral aspect. Considering that the other parts of the genitalia and the modifications of the antennae and maxillary palpi are the same in all this material, and that the modifications that do occur appear to be clinal in nature, we consider these to be all one species. Flint (1965, fig. 10) has provided figures of the male genitalia and Denning (1968, fig. 7) figures of the male basal antennal segment and female genitalia.

*Material.*—MEXICO, Chiapas, Dolores, route 190 km 1190 (20 km S of San Cristobal de las Casas), 8–9 July 1966, Flint & Ortiz, 1♂. Veracruz, La Joya, Rt. 140, km 307 (about 30 km NW of Jalapa), 21 July 1965, Flint & Ortiz, 8♂ 2♀; same, but 1 July 1966, 2♂. GUATEMALA, Solola, 21 km S of Nahuala, 9 Aug. 1967, O. S. Flint, Jr., 2♂.

The species is also recorded from U.S.A., Arizona, and Mexico, Durango.

*Lepidostoma delongi* Ross

*Lepidostoma delongi* Ross, 1946, p. 283.—Fischer, 1970, p. 42.

This species is known only by the unique male type taken at Zitacuaro, Michoacan, Mexico. The male genitalia were illustrated in the original descriptions (Ross, 1946, fig. 12).

*Lepidostoma frontale* (Banks)

*Eremopsyche frontalis* Banks, 1901, p. 367.—Fischer, 1970, p. 83.

*Lepidostoma frontalis*: Flint, 1967B, p. 24.

This species is a very close relative of *L. mexicanum* (Banks) as shown by the male genitalia (Flint, 1967B, fig. 124–125). The only significant differences between these species appear to be in the modifications of the male palpi, antennae and forewings. The basal segment of the antenna is much longer than the head, somewhat enlarged, and ventrally covered with long, scalelike setae that are directed anteriorly forming a rather uniformly smooth ventral surface, with the other surfaces more sparsely covered with setae projecting at all angles. The maxillary palpi are 1-segmented, spatulate, projecting anteriorly, densely covered with elongate, widened setae directed dorsad and anteriorly, the mesal faces are appressed, concave, and bear some short broad setae. The costal margin of the forewing is narrowly reflexed for its entire length, and the upper wing surface is covered with broadened hairs that are intensely purplish-iridescent at the proper angle.

*Material*.—MEXICO, Veracruz, La Joya, Rt. 140, km. 307 (about 30 km N.W. of Jalapa), 1 Aug. 1966, Flint & Ortiz, 1♂. Described from Jalapa, Veracruz, September.

*Lepidostoma heveli* Flint & Bueno, new species  
Figs. 4-5

This species, a member of the *unicolor* group, is very closely related to *L. steinhauseri* n. sp. and more distantly to *L. aztecum* n. sp. The position and shape of the basodorsal process and apical lobes of the clasper, and the lobes of the tenth tergum, are distinctly different in all three species.

*Adult*.—Length of forewing, 11 mm. Color brown, antennae and legs stramineous; forewings brown. Maxillary palpus 1-segmented, outer surface sparsely covered with erect hairs, basal  $\frac{2}{3}$  terete, apical third trianguloid with inner surface concave and bearing some short, broad seta; palpi not contiguous apically. Antenna with basal segment dark, slightly inflated, as long as head, with scattered erect, flattened setae. Forewing with costal cell narrowly reflexed for basal half, margin basally with a sparse fringe of long hairs, entire wing surface bearing erect spatulate hairs, a small area of small scalelike hairs on and adjacent to furcation of vein Rs and nearby on M. Male genitalia: Tenth tergum in lateral aspect divided into two pairs of processes, dorsalmost elongate, slender, narrowly divided middorsally, ventral process with an elongate, slender lobe from posterior margin and several points. Clasper with basodorsal process elongate, close to body of clasper, extending slightly beyond midlength of clasper, ventral arm of process appressed to clasper, bluntly pointed apically; apex with a small, fimbriate apicolateral lobe, a rounded, and compressed central lobe, and a rounded, depressed mesal lobe; with a sinuous basal connection to base of aedeagus. Aedeagus with an enlarged base, a central curved, tubular portion and dorsolateral swordlike processes.

*Material*.—Holotype male: GUATEMALA, Quiche, El Quiche, 7.3 km S Chichicastenango (14°54'N, 91°07'W), 2,400 mts., 28 May 1973. Erwin & Hevel. USNM Type 74074.

*Lepidostoma knulli* Ross

*Lepidostoma knulli* Ross, 1946, p. 280.—Flint, 1967A, p. 175.—Fischer, 1970, p. 58.

*Lepidostoma leechi* Denning, 1962, p. 37 [NEW SYNONYMY].

This species is closely related to *L. bakeri* Flint, not only on the basis of the general structure and appearance of the male genitalia, but also by the apparently identical modifications of the antennae and palpi. There

is some variation in the exact shape of the apicoventral margin of the tenth tergum, and in the length of the basodorsal arm and the apex of the clasper. However, these slight differences appear in all combinations, and the sexual modification of the palpi and antenna are the same throughout. We therefore synonymize *leechi* with *knulli*.

The maxillary palpus of the male is 1-segmented, spatulate, concave mesally and bearing a dense brush of long spatulate setae internally from the base. The basal segment of the male antenna bears mesobasally a short round projection and internally a small spherical structure that can be extruded through this projection.

The male genitalia were well illustrated by Ross (1946, fig. 10), with additional figures of the male genitalia and basal antennal segment by Denning (1962, fig. 5) as *leechi*.

*Material*.—MEXICO, Michoacan, Parque Nacional Morelos, near Morelia, 14 July 1966, Flint & Ortiz, 1♂. Mexico, La Marquesa, Parque Nacional Las Cruces, 5–9 July 1965, Flint & Ortiz, 3♂; same but 13 July 1966, 3♂. The types of *L. knulli* were from U.S.A., Arizona, the types of *L. leechi* from Mexico, La Marquesa, and it has been recorded from Mexico, Durango.

#### *Lepidostoma lacinatum* Flint

*Lepidostoma lacinatum* Flint, 1967A, p. 175.—Denning, 1973, p. 142.

This species appears to bear some relationship to *L. rectangulare* Flint, but is quite distinct in its combination of characteristics. The figures of Flint (1967A, fig. 24–25) and Denning (1973, fig. 12) illustrate the variation in the male genitalia found to date.

The maxillary palpi of the male are 1-segmented, with the apical  $\frac{2}{3}$  trianguloid, concave mesally, and filled with short, broad, scalelike setae. The basal antennal segment is darkened, enlarged, and about as long as the head, the flagellar segments, especially basally are distinctly flattened.

The species has been recorded from Mexico, Durango and Sinaloa, and U.S.A., Arizona.

#### *Lepidostoma mexicanum* (Banks)

*Olemira mexicana* Banks, 1901, p. 367.

*Atomyoides bispinosus* Ulmer, 1911, p. 25.—Fischer, 1970, p. 70 [NEW SYNONYMY].

*Lepidostoma mexicanum*: Ross, 1946, p. 288.—Flint, 1967B, p. 24.—Fischer, 1972, p. 59.

*Lepidostoma alexanderi* Denning, 1962, p. 37.—Flint, 1967A, p. 175.

*Lepidostoma bispinosum*: Denning, 1962, p. 39.—Flint, 1967A, p. 175.

This species is closely related to *L. frontale* (Bks.), differing primarily in the secondary sexual characteristics of the male palpi, antennae and



forewing. We have compared the males and females of this species throughout its rather extensive range and find no discernable pattern in the variations of the tenth tergite, nor does there appear to be any real variation in the female genitalia or secondary male sexual characters. Careful comparison of the female type of *mexicanum* with females associated with males of the *bispinosum* form establishes the fact that these are the same species, and *mexicanum* being the oldest valid name it takes priority over the others.

The maxillary palpi of the male are 1-segmented, with the apical half trianguloid, concave mesally, and filled with short, scalelike setae, the basal antennal segment is enlarged, as long as the head, and bears a covering of erect setae.

The male of the "bispinosum" form was well illustrated by Ulmer (1911, fig. 12-13) and Denning (1962, fig. 7) with the "alexanderi" form shown by Denning (1962, fig. 4). The female genitalia were illustrated by Flint (1967B, fig. 126-127).

*Material*.—PANAMA, Chiriqui, El Volcan, Chiriqui Viejo River, 5,280' 22 July 1964, A. Broce, 1♂. Bambito, 1,500 m, 22 May 1973, G. Ekis, 1♂ 1♀. Boquete, 16-17 July 1967, O. S. Flint, Jr., 3♂ 2♀. COSTA RICA, Heredia, Vara Blanca, 24 June 1967, Flint & Spangler, 15♂ 4♀. Cartago, Navarro, July 1962, F. S. Blanton, 1♂. Volcan Irázu, 2,200-2,500 m, 27-28 May 1936, Reimoser, 2♂ (Vienna). GUATEMALA, Baja Verapaz, Purulha, Schaus & Barnes, 1♀. Izabal, Cayuga, Schaus & Barnes, 1♂. Quezaltenango, Volcan Santa Maria, Aug., Schaus & Barnes, 1♀. MEXICO, Hidalgo, 26.2 km N of Zimapan, 19 May 1973, Erwin & Hevel, 1♀. Michoacan, Parque Nacional Morelos, near Morelia, 14 July 1966, Flint & Ortiz, 3♂.

The species has been recorded from Costa Rica, San Jose (type of *bispinosa*), Mexico, Distrito Federal, Tacubaya (type of *mexicanum*) and Durango, and U.S.A., Arizona (type of *alexanderi*).

#### *Lepidostoma rectangulare* Flint

*Lepidostoma rectangulare* Flint, 1967A, p. 176.

This species appears to be most closely related to *L. talamancense* n. sp. from Costa Rica, but is distinguished by the shape of the apex of the clasper and tenth tergum.

The male genitalia were illustrated by Flint (1967A, fig. 26-27). The species is still known only from the holotype from Durango, Mexico.

#### *Lepidostoma reimoseri* Flint & Bueno, new species

Figs. 10-11

This species, a member of the *unicolor* group, appears to be closely related to *L. rectangulare* Flint and *L. talamancense* n. sp. From these,

*reimoseri* is easily recognized by the more elongate tenth tergum with setate papillae dorsally, and in the shape of the apical lobes of the clasper.

*Adult*.—Length of forewing, 9 mm. Color brown, antennae stramineous; forewing covered with elongate, brown, scalelike hairs with small interspersed spots of stramineous scales, hind wing sparsely covered with brown hairs. Maxillary palpus 1-segmented, very short, appressed to venter of head, inflated apicad, lateral and ventral faces covered with pale, clavate hairs. Antenna with basal segment terete, enlarged, as long as head, covered with dark, clavate hairs; flagellar segments with dark, clavate hairs dorsally. Fore and hind wings, dorsally covered with clavate hairs; foretibia and tarsus externally with some dark, clavate hairs. Male genitalia: Tenth tergum in lateral aspect  $1\frac{1}{2}$  times as long as broad, rounded apically with setate papillae dorsad; in dorsal aspect deeply divided on midline, halves divergent. Clasper with basodorsal process semi-erect, extending to midlength of clasper, ventral arm of process appressed to clasper, rounded apically; apex with a small lateral flange, a small compressed central lobe, and a depressed mesal flap; with a straight basal connection to base of aedeagus. Aedeagus with an enlarged base, a central, curved tubular portion, and dorsolateral swordlike processes reaching to apex of tube.

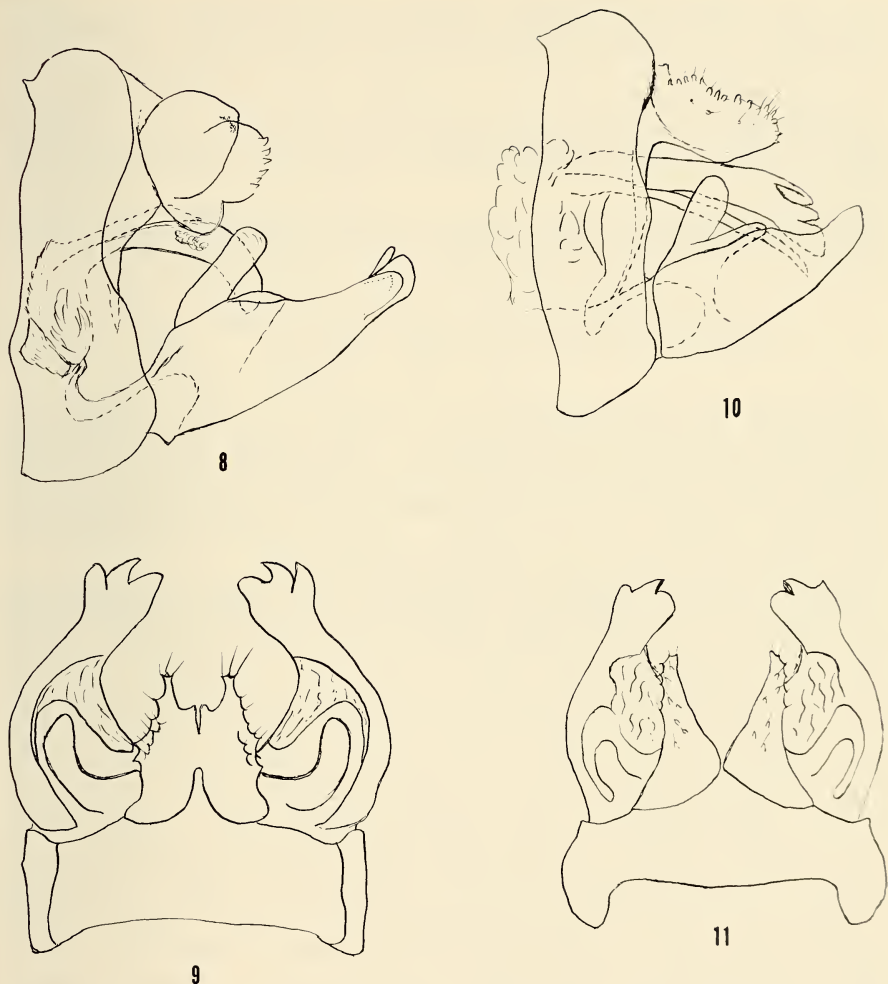
*Material*.—Holotype, male: COSTA RICA, [Cartago], Volcan Irazu, 2,200–2,500 m, 21–28 May, 1930, Reimoser (Vienna Museum). Paratype: Same data, 1♂ (U.S.N.M.).

*Lepidostoma steinhauseri* Flint & Bueno, new species

Figs. 6–7

This species and *L. heveli* n. sp. are very closely related, and were at first believed to be the same species. There are differences between the two in the shape of the processes of the tenth tergum, the apical lobes of the clasper, and the height at which the basodorsal arm of the clasper is borne. However, more important to us than these differences which are only quantitative in nature, are the differences in the secondary sexual modifications. These differences are seen in the maxillary palpi, and especially the forewings which have a much more strongly reflexed costal cell, with a very long hair fringe, no short, scalelike setae, and a more restricted distribution of the spatulate hairs.

*Adult*.—Length of forewing, 12 mm. Color brown; antennae, legs, and thorax ventrally stramineous; forewing brown, mottled with stramineous hairs. Maxillary palpus 1-segmented, shorter than head, outer surface covered with erect hairs; basal half terete, apical half trianguloid, with inner surface concave with small scalelike setae. Antenna with basal segment dark, slightly inflated, shorter than head, with long, erect setae.



Figs. 8-11. Male genitalia. *Lepidostoma talamancense* n. sp.: 8, Lateral; 9, Dorsal. *L. reimoseri* n. sp.: 10, Lateral; 11, Dorsal.

Forewing with costal cell narrowly reflexed for basal half and with margin bearing a dense fringe of long setae; surface with many erect, spatulate hairs beneath fringe, and in a broad band from base almost to apex between  $R_3$  and  $M_4$ , these hairs forming an enlarged hump at the base of  $M$ . Male genitalia: Tenth tergum in lateral aspect divided into two pairs of processes, dorsalmost elongate, divided middorsally, ventralmost with a narrow, lateral, winglike lobe and a short, terete ventral lobe. Clasper with basodorsal process elongate, raised above, but parallel to, body of clasper.

extending to midlength of clasper, ventral arm of process appressed to body of clasper, broadly pointed in dorsal aspect; apex with a large, fimbriate apicolateral lobe with a distinct basolateral lobe, an elongate, rounded and compressed central lobe, and a winglike depressed mesal lobe; with a sinuous basal connection to base of aedeagus. Aedeagus with an enlarged base, a central, curved, tubular portion, and broad, dorsolateral sword-like processes.

*Material*.—Holotype, male: EL SALVADOR, Santa Ana, Cerro Miramundo, 2,300 m, 23 Jan. 1971, S. Steinhauser. USNM Type 74075.

*Lepidostoma talamancense* Flint & Bueno, new species

Figs. 8–9

This species is closely related to *L. reimoseri* n. sp. and is probably its sister species found in the Cordillera de Talamanca. The primary differences between these two species lie in the tenth tergum which in *talamancense* is short and round apically, and in dorsal aspect has a distinct mesal shoulder. The secondary sexual modification so apparent on the wings of *reimoseri* are lacking in *talamancense*.

*Adult*.—Length of forewing, 9–13 mm. Color brown; antennae and legs stramineous; forewing either golden brown with dark flecks, or dark brown with scattered golden flecks, with a tuft of pale hairs on hind margin. Maxillary palpus 1-segmented, spatulate, outer surface covered with long, slightly flattened setae; inner face concave apically and filled with small, scalelike setae. Antenna with basal segment darkened, terete, slightly inflated, as long as head. Wings and legs without sexual modifications. Male genitalia: Tenth tergum in lateral aspect as high as long, apex rounded, serrate; in dorsal aspect with a distinct mesal angle. Clasper with basodorsal process semierect, extending not quite to midlength of clasper, ventral arm of process appressed to clasper, broadly rounded apically; apex with a well-developed lateral lobe, a compressed central lobe, and a depressed mesal flap. Aedeagus with an enlarged base, a central, tubular, portion, and small dorsolateral process not reaching apex of central tube.

*Material*.—Holotype, male: COSTA RICA, Cartago, Ojo de Agua, route 2 km 75, 30 June 1967, Flint & Ortiz. USNM Type 7076. Paratype: Same data, 1♂ 2♀; same, but 20 July 1967, 3♂ 2♀.

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